CLAIMS

1. A biochemical device comprising a surface for immobilising a biochemical species, wherein said surface is at least partially covered with a nanocrystalline metal oxide semiconductor film, said film providing a recipient surface for immobilisation of said biochemical species.

2. A biochemical device according to claim 1, wherein said nanocrystalline metal oxide is titanium dioxide.

3. A biochemical device according to claim 1, wherein said nanocrystalline metal oxide is zinc oxide.

4. A biochemical device according to claim 1, wherein said nanocrystalline metal oxide is zirconium dioxide.

Replaced by Art 34 Amdt

5. A biochemical device according to ~~any of claims 1 to 4~~ claim 1, comprising at least one biochemical species immobilised on at least a portion of said film.

6. A biochemical device according to claim 5, wherein said biochemical species is a protein.

7. A biochemical device according to any of claims 1 to 6, wherein the film further comprises biomolecules immobilised on it, said biomolecules being adapted for attachment by a biochemical species.

8. A biochemical device according to ~~any of claims 1 to 7~~ claim 1, wherein said biochemical device is a biosensor.

9. A biosensor according to claim 8, wherein said film forms an array on said surface.

10. A biosensor according to claim 9, wherein different biochemical species are bound to different portions of the array.

11. A biosensor according to ~~any of claims 8 to 10~~ Claim 1, wherein a further portion of said surface is coated with a pH sensitive dye.

12. A biosensor according to any of claims 8 to 11, wherein said biosensor is an electrochemical biosensor, further comprising an electrical circuit electrically connected to said film, said circuit comprising a detector for monitoring changes in the current or voltage in the circuit produced by an electrochemical reaction.

13. A biosensor according to any of claims 8 to 11, wherein said biosensor is an optical biosensor, further comprising an optical sensor for monitoring a reaction by sensing the interaction of electromagnetic radiation with the molecules present.

14. An optical biosensor according to claims 5 and 13, wherein said at least one immobilised biochemical species is a fluorescent or fluorophore labelled biochemical species, said film is optically transparent, and said biosensor further comprises a light source and control electronics for calculating concentrations from the output of said optical sensor.

15. A biosensor according to any of claims 8 to 11, further comprising an electrical circuit electrically connected to said film, and an optical sensor.

16. A biosensor according to claim 15, wherein said immobilised biochemical species is such that it can be electrochemically or photochemically switched to a sensing state by oxidation or reduction, the results of the sensing reaction being measured optically or electrically.

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17. A biosensor according to any of claims 8 to 16, wherein said biosensor further comprises an element for supplying power to said biosensor.

18. A biosensor according to claim 17, wherein said power supplying element comprises a photoelectric element operable to supply power to said biosensor in response to electromagnetic radiation.

19. A biosensor according to claims 2 and 18, wherein a portion of said TiO_2 film forms said photoelectric element.

20. A biochemical device according to any of claims 1 to 7, wherein said biochemical device is a reactor for synthetic, catalytic or biodegradation reactions.

21. A biochemical device according to claim 20, further comprising an electrical source electrically connected to said film, said reaction being driven electrically.

22. A biochemical device according to claim 21, wherein said electrical source comprises a photoelectric element.

23. A biochemical device according to claims 21 and 22 wherein a portion of said TiO_2 film forms said photoelectric element.

24. A biochemical device according to claim 20, said device being operable to receive external radiation in order to optically drive said reaction.

25. A biochemical device according to claim 20, further comprising a light source, said reaction being driven optically.

26. A method of manufacturing a biochemical device, comprising covering at least a portion of a sensing surface with a film of nanocrystalline semiconductor, contacting said

preformed film with a biochemical species such that said biochemical species is immobilised onto said film.

27. A method of manufacturing a biochemical device according to claim 26, wherein said film of nanocrystalline semiconductor is applied to said sensing surface by screen printing.

28. A method of manufacturing a biochemical device according to claim 26 or 27, wherein said preformed film is contacted with a biochemical species by immersion of said at least partially covered surface in an aqueous solution of the biochemical species.

29. A method of manufacturing a biochemical device according to claim 26 or 27, wherein the biochemical species is deposited on the film using a gridding robot, or other dispensing device such as an ink-jet printer.

30. A method of manufacturing a biochemical device according to any of claims 26 to 29, wherein the temperature at which the film is contacted with the biochemical species is substantially 4°C.

31. A method of manufacturing a biochemical device according to any of claims 26 to 30, wherein said biochemical species is a protein.